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ABSTRACT

The faculty of the College of Education at the University of Nebraska at Omaha, under the leadership of the dean, has developed a model for technology integration into teacher education. This document discusses the three key elements that are key to effectively integrating technology in teacher training: equipment, faculty training, and expectations. Desktop microcomputers for faculty and support staff, three mobile multimedia teaching stations, a local area network, and student microcomputer laboratories have been implemented and a project to install "high-tech" classrooms throughout the campus is underway. The faculty development efforts were designed around three levels: awareness, experience, and integration. Training activities addressed improving instruction, expanding research, and increasing scholarship using resources available through educational technology. The training was addressed in summer intercessions and lunch hour presentations. Expectations and encouragement for educational technology were provided by the dean's office and individual departments. The college also established an Educational Technology Task Force, comprised of faculty, administrators, and support staff from all departments to provide operational direction. The use and integration of technology has greatly increased in the College of Education over the past few years. (Contains seven references.) (AEF)

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Goal: Technology-Using Teachers; Key: Technology-Using Education Faculty

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Preparing teachers to use computer-related technology in their classrooms is an exciting challenge for the educational community, especially for teacher preparation institutions. Teacher education is often criticized for the lack of technology preparation education majors are receiving. In a 1990 national survey, 81% of the student teachers surveyed rated their undergraduate preparation in technology use as inadequate (Fratianni, Decker, & Korver-Baum, 1990) and in a 1992 study over 67% of the Iowa teachers surveyed evaluated their preparation in college to use computer-related technology as inadequate (Topp, 1993).

To address the issue of educational technology, two national organizations, the International Society for Technology in Education (ISTE), and the National Council for Accreditation of Teacher Education (NCATE), have jointly written goals for the educational computing and technology preparation of students in teacher education programs. These goals include demonstrating knowledge about computers and the effective use of computers in classrooms (Wetzel, 1992). These goals are not only focused on individual computer proficiencies, but also, on the strategies and skills needed to incorporate computer-related technologies into learning and teaching.

Many teacher education institutions are implementing steps to achieve the ISTE/NCATE goals, as well as their own goals for preparing future and present teachers in the use of education technology. This changing process is important to the future of education and its institutions.

Three Key Elements: Equipment, Training, and Expectations

Three elements seem to be key in the increased use of technology in teacher education institutions. First, the *equipment* must be available for both faculty and student use (Johnson & Harlow, 1993; Novak & Berger, 1991). A computer on the faculty member's desk is one of the first steps in using the computer-related technology in teaching. When the computer becomes a necessary tool for the teacher, then the use in the classroom is the next logical step (Johnson & Harlow, 1993). In addition, if computers are to be used for class purposes, a facility that will accommodate such class activity is necessary (Gunn, 1992).

The second element involved in faculty empowerment with technology involves faculty *training*. Because of the perceived stature of the higher education faculty member, it is often assumed that they need little training in the use of something new, in this case, computers. This is usually untrue, and the training and subsequent support and coaching are vital if effective use of technology in higher education is going to take place (Wetzel, 1992).

The *expectation* that faculty will actively include technology in their teaching and research is the third element related to increased technology use. Faculty members need to feel that effective use of technology is expected for all appropriate courses and situations. They need to feel they are being supported, as well as encouraged to use and model teaching techniques that include efficient uses of technology (Nelson, Andri, & Keefe, 1991; Novak

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& Berger, 1991). Faculty members must also believe that their environment is supportive of the "risk taking" necessary for trying new teaching/learning techniques involving technology. Some universities have included the integration of technology into classroom teaching as a part of the faculty growth formula, while others have encouraged technology integration through equipment allocations (Gunn, 1992). The perception that using technology in teaching is expected, and worth the risk, is an important factor in the continued increase of educational technology use in teacher preparation programs.

The University of Nebraska at Omaha College of Education Model for Technology Integration

The faculty of the College of Education at the University of Nebraska at Omaha, under the leadership of the dean, has developed a model for technology integration into teacher education. Educational technology was identified as a major goal by the college eight years ago. This goal was divided into teaching about educational technology, teaching with educational technology, integrating educational technology into the design and delivery of curricula, and engaging in research regarding the use and effects of educational technology in the teaching/learning process.

The college initially developed a plan addressing the three areas presented in the previous section of this paper; equipment, training, and expectations. This plan has evolved over the past several years, and will continue to evolve, as the faculty progresses and educational technology and its use continues to change.

Equipment

During the past seven years, the College of Education has made a concerted effort to provide faculty and support staff with desktop microcomputers. Three general guidelines were established to provide direction and rationale for these computer purchases. First, the support staff of the college would use a PC platform for administrative functions. This provided uniformity across the college as well as easy electronic transfer of data. Second, faculty were allowed to choose either a PC environment or a Macintosh environment for their personal desktop microcomputer. Third, high-end users would receive newer models, while trickling down their computers to low-end users. These guidelines provided general direction as the college moved ahead in providing basic microcomputer technology to each faculty and staff member in the college.

In order to help in the teaching process, the college has designed, built, and equipped three mobile multimedia teaching stations called Smart Carts. Each of these Smart Carts is equipped with a microcomputer (2 have PC's and 1 has a Macintosh), an overhead projector and LCD panel, a video projector, a VCR, a laserdisc player, and a CD-ROM player. These carts can be moved from classroom to classroom throughout the two main buildings used by faculty of the College of Education.

The University, following the lead of the College of Education, has recently begun a project designed to develop and install "high-tech" classrooms throughout the campus. These classrooms contain state-of-the-art multimedia equipment to support integration of educational technology into the design and delivery of curricula. Currently, there is a "high-tech" classroom in one of the two buildings occupied by the College of Education, and two more "high-tech" classrooms are scheduled to be installed in College of Education buildings in 1995.

Early in the technology planning process, the college installed ethernet connections in all faculty offices, instructional areas, microcomputer laboratories, research laboratories, and support staff workstations in preparation for a local area network (LAN). Once connectivity was established for this LAN, a college file server was purchased and installed.

It was necessary for the college to employ a LAN administrator to service the growing educational technology needs of the college. Initially, a graduate student in computer science was employed to manage the college LAN on a part-time basis. The demands on the LAN administrator soon exceeded the part-time appointment, and a full-time position was developed for an educational technology coordinator for the college. This position, in addition to administering the LAN, provides support services to all faculty and staff within the college, as well as equipment maintenance and installation. The educational technology coordinator also assists in educational technology research and provides one-on-one technical assistance to all faculty and staff in the use of the college LAN and its resident software programs.

Recognizing that computers for student use was important to the educational program, the college has written proposals in which grant funds have been used to establish student microcomputer laboratories. Several sources of outside funding have been obtained over the last seven years to purchase equipment for several student labs. The most recent addition to the college's student facilities is a 30-station PowerMac Electronic Data Connectivity Microcomputer Laboratory, funded in part by U S WEST Communications.

As the laboratories became outdated, it has become necessary to replace older computers (e.g., Apple IIes, XTs, 286's) with newer equipment. This has been accomplished with college and grant funds. It is important for the college to provide students in the teacher education program with basic hands-on experiences with PC, Apple, and Macintosh platforms. These experiences provide students with the skills necessary to use the basic microcomputer technology found in most K-12 schools. Beyond the basic instruction on the various platforms, students receive more in-depth instruction using the Apple and Macintosh microcomputers, as these are the prevalent platforms found in local school districts.

Training

The faculty development efforts of the college were designed around three levels: awareness, experience, and integration. In the awareness level, faculty were provided with several opportunities to merely be exposed to the vast uses of educational technology in the classroom. These

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sessions focused on getting faculty aware of and excited about the potential of technology use in the teaching and learning process. Also, it further provided faculty with a basic knowledge of several software programs. For the experience level, faculty were provided with opportunities to experience some of the technology uses in a supportive and comfortable "hands-on" environment, where knowledgeable individuals were available for assistance. For the integration level, faculty were provided with learning opportunities which focused on sharing how certain technologies might be used in instruction. This phase also permitted faculty to share with each other some of their integration ideas and plans. Each of these training activities addressed improving instruction, expanding research, and increasing scholarship using the resources available through educational technology. This training of faculty and staff at each level, has been addressed in two primary ways, summer intercession training and brown bag presentations.

Summer Intercession Training. The college provided faculty the opportunity to engage in "hands-on" training sessions during summer intercessions. These training sessions have typically been for one to three weeks. Initially, faculty were all provided with basic instruction regarding the use of a networked microcomputer laboratory along with its software. During the sessions, each faculty member developed projects that utilized the technology and were relevant to their respective areas of expertise. Eventually, the intercession summer training sessions became more individualized, focusing upon specific needs and interests of participating faculty. Upwards of twenty faculty per year have participated during the five years this program has been in operation. In addition, the training format has been altered to provide large group instruction as well as one-on-one instruction and technical assistance.

The overall training during these intercession activities was designed to meet the needs of faculty members at their own level of expertise. The expertise of participating faculty ranged from those with very little knowledge of technology, and no experience with its use in teaching, to those with some knowledge of technology, who do not currently incorporate it into their teaching, to those currently using technology to some degree in their classroom instruction. All sessions encouraged faculty to address their own specific needs and interests, and to help be a resource to each other following the session.

The following topics have been addressed over the past five years:

- productivity tools for curriculum integration (MS Works, Storyboard, Linkway, HyperCard, Persuasion, and Harvard Graphics);
- resource applications (instructional aspects of the Internet that support the teaching/learning process, and applications of Mosaic for effective navigation through the Internet);
- experiential applications of integrated hardware and software resources available in high tech classrooms or with mobile multimedia carts;
- integration of computer managed educational technology and media in the classroom; and
- restructuring teaching and learning applications using educational technology in a high tech environment.

Brown Bag Presentations. In addition to the intercession training, the college also provided training throughout the academic year in a series of "brown bag" lunch hour presentations. These were offered by the college's Educational Technology Coordinator and several technology-using faculty members. These presentations primarily focused upon the use and integration of software programs resident on the college's file server, which is connected to every faculty member's office and all instructional classrooms in the buildings used by the College of Education via a local area network (LAN). Topics for these workshops included a variety of software applications such as MS Works, Paradox for Windows, SPSS, E-Mail, Gopher, Trumpet News, FTP, and Mosaic, as well as other high interest topics such as the use of multimedia and the Internet. These focused sessions, usually one hour in duration, were followed by coaching and encouragement from the instructors, as faculty and staff members implemented the newly learned skills.

Expectations of Technology Use

Expectations and encouragement are vital to the infusion of technology into the educational process. In the College of Education at UNO, these expectations have come from the dean and associate dean, the departmental chairs, and the general faculty.

The dean's office has consistently provided high expectations and much encouragement for educational technology use by faculty. This has been accomplished in four ways: a) identifying educational technology as one of the two major goals of the college, b) expenditure of college funds to purchase educational technology, c) support of faculty engaged in advancing the use of education technology, and d) strengthening educational technology through grants and other outside funding sources.

Individual departments within the college have also encouraged integration of technology into their respective areas. Technology use and infusion are frequent topics of departmental meetings. Also, proficiency in using and integrating technology is a factor in the selection process, as new professors are hired.

The college also has established an Educational Technology Task Force, comprised of faculty, administrators, and support staff, from all departments. This group has been instrumental in providing operational direction to the educational technology vision provided by the dean of the college. This task force, operating in concert with information provided by a similar group of educational technology personnel representing the seven metropolitan Omaha school districts, has provided the college with input that has resulted in:

- A College of Education mission statement for educational technology.
- Goals and objectives for the college in the area of educational technology.
- Educational technology competencies expected of all preservice and inservice teachers.

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- Research studies reflecting the type and amount of educational technology utilized by the faculty of the college.
- A coordinated plan for the purchase of all educational technology equipment for the college.
- A formal advisory group to the dean of the college for feedback and future directions related to technology integration.

Results

The use and integration of technology has greatly increased in the College of Education over the past few years. All full-time faculty members use e-mail as a part of their academic routine, as well as a significant number of faculty now regularly use presentation software, such as Persuasion, to deliver class presentations, use resources on the Internet, or take their classes to one of the college's computer laboratories (such as to demonstrate the use of electronic mail or accessing the campus wide library and information system). Also, many professors are including educational technology as a part of their research agendas.

As the emphasis on technology has increased, many uses of technology have involved individual applications for specific courses. Such integration has included a wide variety of computer uses, ranging from multivariate computer analysis in graduate research courses, to the simple use of word-processing in undergraduate basic education courses. All departments have made a concentrated effort to keep up with the college goals, and to integrate technology into their academic activities.

More advanced and focused technology courses, instructed by the Teacher Education Department, are also available for college-wide enrollment. These courses include an undergraduate instructional systems course, and a sequence of five graduate education courses, which all focus on educational technology use in the classroom.

Yet in addition to the more formal integration of technology into the college departments, such as in the courses offered, an informal "computer culture" is also developing among the faculty, both within and between departments. This "computer culture" is often most apparent by the genuine interest in educational technology shown by most everyone on the faculty, as evidenced by the routinely high enrollment in the optional intercession training sessions (often as much 1/3 of the faculty at any one time). This evolving "computer culture" has also worked to help bring individual college departments more together, by involving them in a shared interest and common training activity. This shared interest has even facilitated several joint projects between departments, such as a technology-rich mathematics and literacy clinic for learning disabled elementary students.

Summary

The model set forth by this paper focuses on three important elements to reach the goal of effective integration of technology into the College of Education curriculum. These three elements, equipment, training, and expectations, must all be addressed by the teacher preparation institution. Up to date equipment must be available to all faculty, staff, and students. Faculty and staff must be given training, as well as support and coaching, that addresses all levels of expertise. And, of course, there must be a consistent expectation that educational technology is important and must be used and integrated by all educators.

The overall mission of the college has been to improve learning for all students. Including educational technology in the preparation of future and present teachers is an important factor in achieving this goal. In order to effectively infuse technology, the faculty must become aware of technology's potential, and they must be active and confident users of technology. The College of Education at the University of Nebraska at Omaha has seen significant progress toward achieving the goal of technology integration, through the use of the plan described in this paper.

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